

**THRUST BLOCK NOTES**

- THRUST BLOCKS SHALL BE REQUIRED AT THE FOLLOWING LOCATIONS:
  - ALL CHANGES IN DIRECTION.
  - ALL DEAD-ENDS.
  - ALL VALVES 10-INCH AND LARGER (SIZE FOR CLOSED CONDITION).
  - AT OTHER LOCATIONS REQUIRED BY THE ENGINEER.
  - AT TEMPORARY DEAD ENDS DURING PIPE INSTALLATION AS REQUIRED FOR TEMPORARY PRESSURE TESTING.
  - AT OTHER LOCATIONS REQUIRED BY THE ENGINEER.
- THRUST BLOCKS SHALL BE SIZED AS REQUIRED BY SOIL CONDITIONS AND DESIGN PRESSURE.
- PLACE CONCRETE AGAINST UNDISTURBED TRENCH WALL.
- CONCRETE SHALL BE 2,500 PSI MINIMUM.
- ALL CONCRETE SHALL BE PLACED SO THAT PIPE, FITTING JOINTS, BOLTS AND NUTS, ETC., WILL BE ACCESSIBLE FOR REPAIRS.
- PLACE ONE LAYER OF VISQUEEN BETWEEN FITTING AND CONCRETE TO FACILITATE FUTURE REMOVAL OF THRUST BLOCK IF REQUIRED.
- ANCHOR RODS SHALL BE 3/4" DIAMETER GALVANIZED STEEL RODS OR #6 EPOXY COATED REINFORCEMENT BAR, AASHTO M284, HAVING AN 18" MINIMUM EMBEDMENT IN CONCRETE.
- THRUST BLOCKING SHALL BE SIZED FOR 150 PSI WATER PRESSURE
- IF THE REQUIRED BEARING AREA IS LESS THAN 1 SQUARE FOOT, A THRUST BLOCK SHALL NOT BE REQUIRED.

**DETERMINATION OF THRUST BLOCK BEARING AREA**

NOTE: WHEN THRUST BLOCK BEARING AREA IS NOT SPECIFIED ON THE PLANS OR DETERMINED BY THE ENGINEER, THE FOLLOWING PROCEDURE SHALL BE USED TO DETERMINE REQUIRED BEARING AREA.

- DETERMINE THRUST (T) FOR TYPE OF FITTING OR JOINT AND SIZE OF PIPE, FROM TABLE NO. 1 OR TABLE NO. 3.
- DETERMINE BEARING CAPACITY (B) OF SOIL FROM TABLE NO. 2.
- DETERMINE REQUIRED BEARING AREA (A) AS FOLLOWS:  
 $A = T \div B$

EXAMPLE: DESIGN PRESSURE = 175 PSI  
 PIPE = 12"  
 FITTING = TEE  
 SOIL - SANDY GRAVEL  
 FROM TABLE NO. 1: T = 15,310 LB.  
 FROM TABLE NO. 2: B = 3,000 LB/FT<sup>2</sup>  
 $A = 15,310 \div 3,000 = 5.10 \text{ FT}^2$

TABLE NO. 1

THRUST AT FITTINGS IN POUNDS AT 100 PSIOF WATER PRESSURE

PIPE SIZE	TEES AND DEAD ENDS	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4"	1,850	2,610	1,420	720	394
6"	3,800	5,370	2,910	1,470	810
8"	6,580	9,300	5,040	2,550	1,372
10"	10,750	15,200	8,240	4,170	2,216
12"	15,310	21,640	11,720	5,940	3,128
14"	20,770	29,360	15,910	8,060	4,241
16"	26,880	38,010	20,590	10,430	5,468
18"	29,865	42,235	22,858	11,653	5,855

NOTE: FOR WATER PRESSURES DIFFERENT THAN 100 PSI, MULTIPLY THRUST FOUND IN TABLE NO. 1 BY REQUIRED PROPORTION.  
 EXAMPLE: DESIGN PRESSURE = 175 PSI, MULTIPLY VALUE IN TABLE BY 1.75

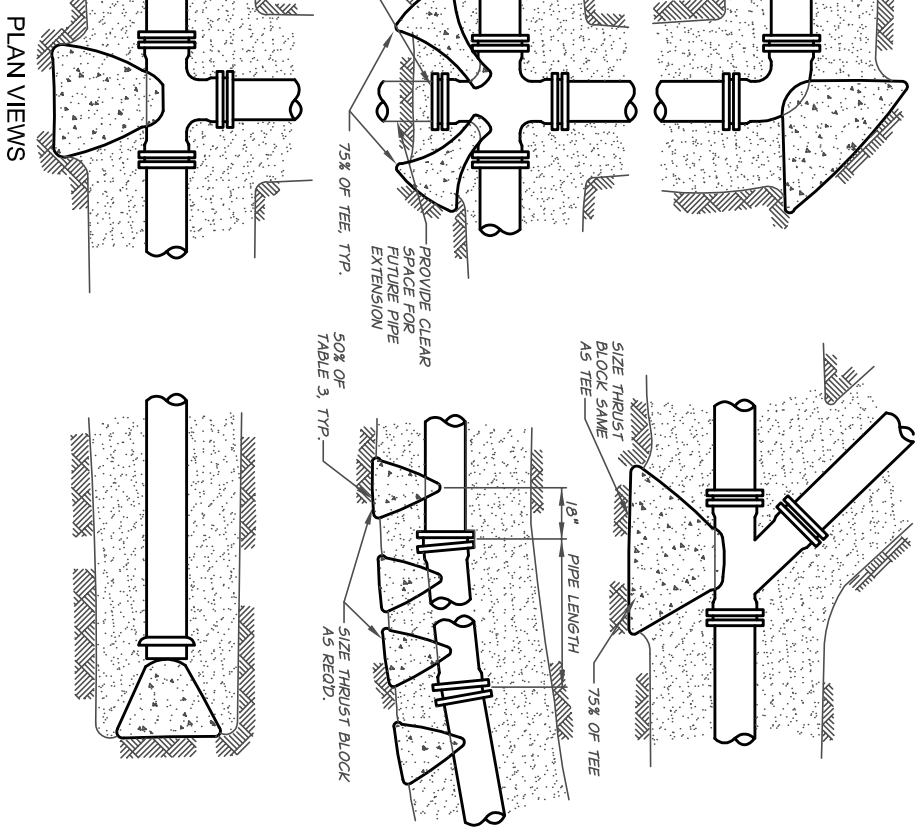
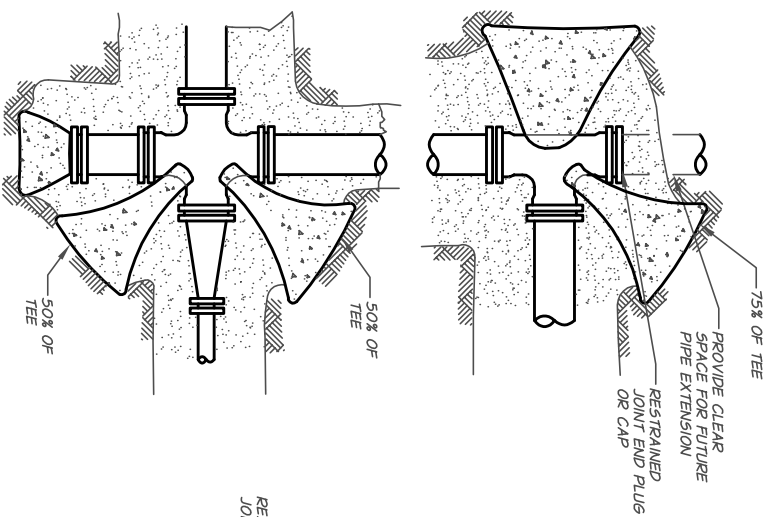
TABLE NO. 2

SOIL	SAFE BEARING LOAD LB/FT <sup>2</sup>
SOFT CLAY	500
SILT	1,000
SAND	2,000
SAND AND GRAVEL	3,000
SAND AND GRAVEL CEMENTED WITH CLAY	4,000
HARD CLAY	4,000

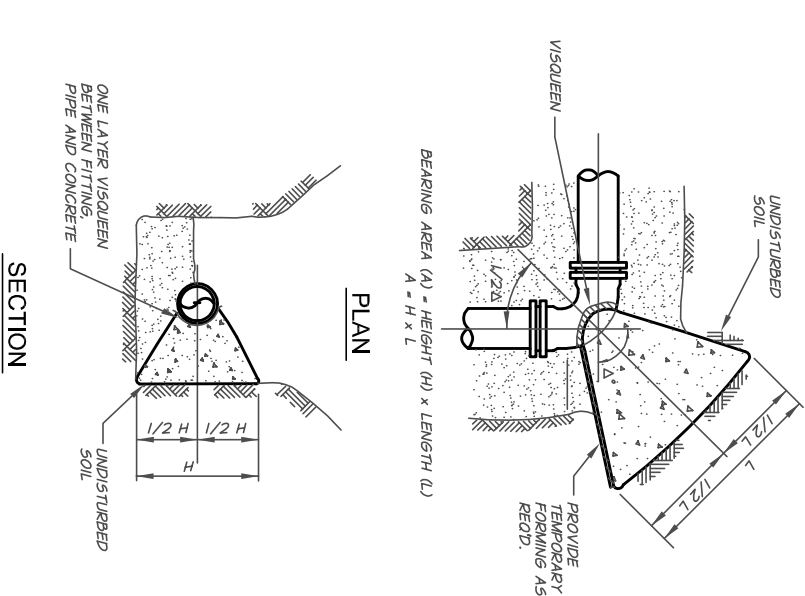
TABLE NO. 3

PIPE SIZE	SIDE THRUST-LB PER DEGREE OF DEFLECTION	PIPE SIZE	SIDE THRUST-LB
4"	N/A	14	377
6"	N/A	16	486
8"	N/A	18	665
10"	197	20	790
12"	278	24	1,150

MULTIPLY THRUST BY DEGREE OF DEFLECTION TO OBTAIN TOTAL THRUST



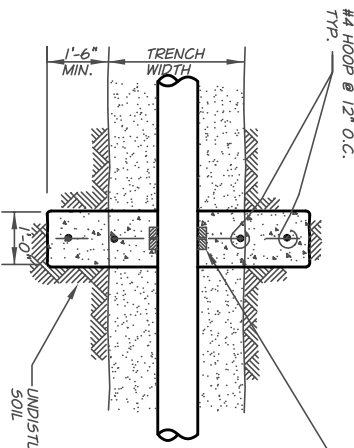
**PLAN VIEWS**



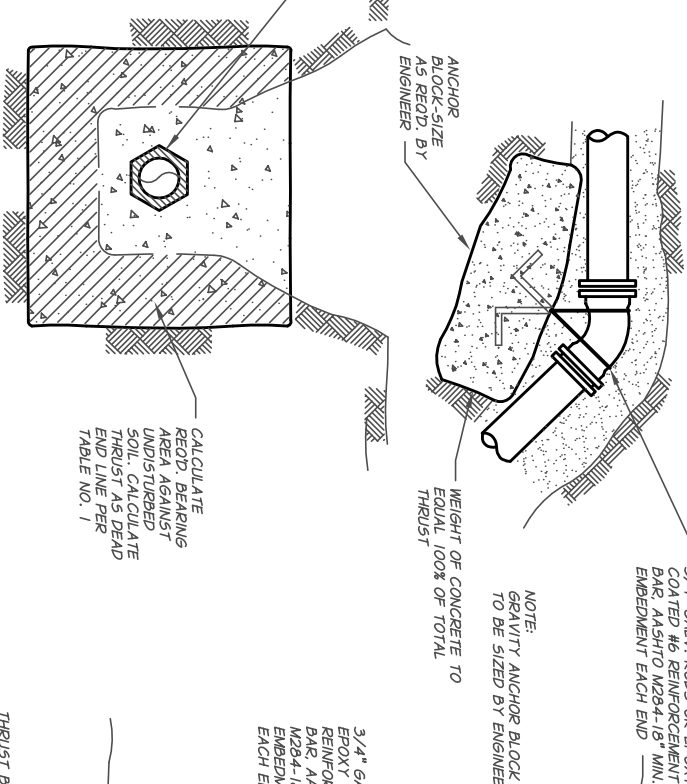
**TYPICAL THRUST BLOCK DETAILS**

**SECTION**

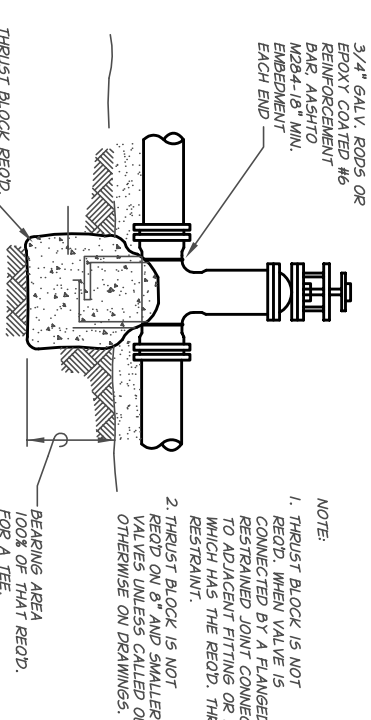
**PLAN**



MEGALUG RESTRAINED JOINT DEVICE BY EBAA IRON, INC. OR APPROVED EQUAL. MEGALUG REQD. TO TRANSFER THRUST FROM PIPE TO CONCRETE COLLAR. TWO REQD. ONE FOR EACH DIRECTION



NOTE: GRAVITY ANCHOR BLOCK TO BE SIZED BY ENGINEER WEIGHT OF CONCRETE TO EQUAL 100% OF TOTAL THRUST



NOTE: 1. THRUST BLOCK IS NOT REQD. WHEN VALVE IS CONNECTED BY A FLANGED OR RESTRAINED JOINT CONNECTION TO ADJACENT FITTING OR PIPE WHICH HAS THE REQD. THRUST RESTRAINT. 2. THRUST BLOCK IS NOT REQD. ON 6\"/>

**TYPICAL THRUST BLOCK LOCATIONS**

**SECTION VIEWS**

**ANCHOR COLLAR**

**REVISION**

**DATE**

**CITY OF UNION OREGON**

**STANDARD WATER DETAILS THRUST BLOCK DETAILS**

**FIGURE W13**